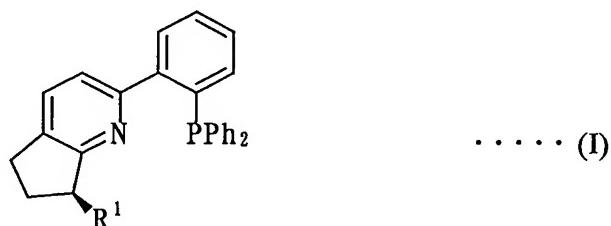
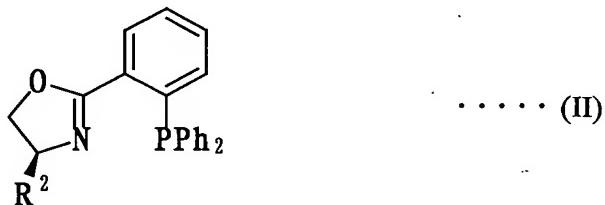


What is claimed is:

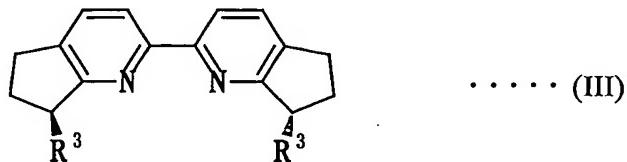
1. A method of producing an optically active lactone compound, which comprises using as a catalyst a complex in which Pd or Pt is a central metal and a ligand is selected from the group consisting of a compound represented by the following formula (I), (II), (III) or (IV) and its enantiomer, and subjecting a cyclic ketone compound to a Baeyer-Villiger oxidation with at least one oxidizer selected from the group consisting of hydrogen peroxide, urea-hydrogen peroxide adduct and alkyl hydroperoxide:



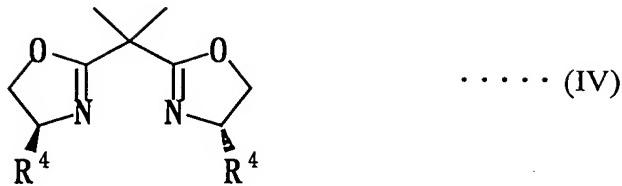
(wherein  $\text{R}^1$  is a linear or branched alkyl group having a carbon number of 1 to 10 provided that a hydrogen atom of the alkyl group may be substituted with t-butyldimethylsiloxy group);



(wherein  $\text{R}^2$  is an aryl group having a carbon number of 6 to 10 or a linear or branched alkyl group having a carbon number of 1 to 10);



(wherein  $\text{R}^3$  is independently a linear or branched alkyl group having a carbon number of 1 to 10 provided that a hydrogen atom of the alkyl group may be substituted with t-butyldimethylsiloxy group);



(wherein R<sup>4</sup> is independently an aralkyl group having a carbon number of 7 to 11 or a linear or branched alkyl group having a carbon number of 1 to 10).

2. A method according to claim 1, wherein a counter ion of the complex is SbF<sub>6</sub><sup>-</sup> or BF<sub>4</sub><sup>-</sup>.

3. A method according to claim 1, wherein the central metal of the complex is Pd.

4. A method according to claim 1, wherein the ligand of the complex is a compound represented by the formula (I) in which R<sup>1</sup> is i-propyl group or 1-methyl-1-(t-butyldimethylsiloxy) ethyl group, or its enantiomer.

5. A method according to claim 1, wherein the ligand of the complex is a compound represented by the formula (II) in which R<sup>2</sup> is phenyl group or t-butyl group, or its enantiomer.

6. A method according to claim 1, wherein the ligand of the complex is a compound represented by the formula (III) in which R<sup>3</sup> is t-butyldimethylsiloxyethyl group or 1-methyl-1-(t-butyldimethylsiloxy)ethyl group, or its enantiomer.

7. A method according to claim 1, wherein the ligand of the complex is a compound represented by the formula (IV) in which R<sup>4</sup> is benzyl group or t-butyl group, or its enantiomer.

8. A method according to claim 1, wherein the complex comprises Pd as a central metal, a compound represented by the formula (I) in which R<sup>1</sup> is i-propyl group, or its enantiomer as a ligand and SbF<sub>6</sub><sup>-</sup> as a counter ion.

9. A method according to claim 1, wherein the cyclic ketone compound is represented by the following formula (V), (VI) or (VII):

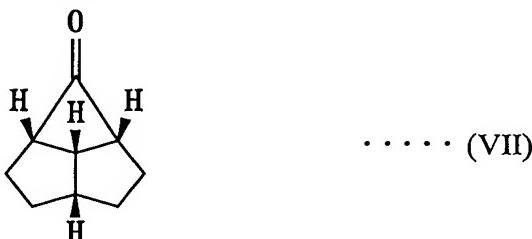


(wherein R<sup>5</sup> is a substituted or non-substituted alkyl group having a carbon number of 1 to 20 or a substituted or non-substituted aryl group having a carbon

number of 6 to 15);



(wherein  $R^6$  is independently a substituted or non-substituted alkyl group having a carbon number of 1 to 20 or a substituted or non-substituted aryl group having a carbon number of 6 to 15);

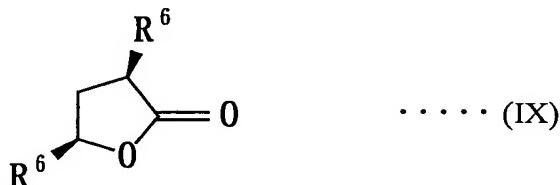


10. A method according to claim 9, wherein the cyclic ketone compound is 3-phenyl cyclobutanone, 3-(p-chlorophenyl) cyclobutanone, 3-(p-methoxyphenyl) cyclobutanone, 3-(2-naphthyl) cyclobutanone or 3-octyl cyclobutanone.

11. A method according to claim 1, wherein the lactone compound is represented by the following formula (VIII), (IX) or (X):



(wherein  $R^5$  is the same meaning as mentioned above);



(wherein  $R^6$  is the same meaning as mentioned above);



12. A method according to claim 11, wherein the lactone compound is  $\beta$ -phenyl- $\gamma$ -butyrolactone,  $\beta$ -(p-chlorophenyl)- $\gamma$ -butyrolactone,  $\beta$ -(p-methoxyphenyl)- $\gamma$ -butyrolactone,  $\beta$ -(2-naphthyl)- $\gamma$ -butyrolactone or  $\beta$ -octyl- $\gamma$ -butyrolactone.

13. A method according to claim 1, wherein the Baeyer-Villiger oxidation is conducted in at least one organic solvent.

14. A method according to claim 13, wherein the organic solvent is 1,2-dichloroethane, dichloromethane, 1,4-dioxane, diethyl ether, ethyl acetate, ethanol, acetone, dimethylformamide, 1,2-dimethoxyethane or tetrahydrofuran.